United States Department of Agriculture

Natural Resources Conservation Service Part 641 Drafting and Drawings National Engineering Handbook

# **Chapter 1**

# Computer Aided Design (CAD) Standards

Issued January 2006
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#### **Preface**

Computer Aided Design (CAD) tools are widely used by United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) employees for developing deliverables in carrying out the agency's mission of providing leadership in a partnership effort to help people conserve, maintain, and improve our natural resources and environment. This document provides standards for use in the development of NRCS deliverables to ensure consistency in products nationwide.

#### **Acknowledgments**

The CAD standards provided in this document are a compilation of adaptation of technology and standards from both industry and Federal agencies. This version was prepared by the NRCS CAD Standards Development Team appointed by the Director of the Conservation Engineering Division in 2002. The team was comprised of a cross-section of NRCS employees from across the nation to provide perspectives from various CAD skill levels, usage, and all-around CAD needs for the agency. The team functioned under the leadership of the chairperson, who prepared the document with input and review from all parties. The CAD Standards Development Team was made up of the following NRCS employees:

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<sup>\*</sup>Employees who served and then were replaced following their departure for positions in other offices and/or agencies.

# **Chapter 1**

# Computer Aided Design (CAD) Standards

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### **Chapter 1**

### **Computer Aided Design Standards**

#### 641.0100 Introduction

#### (a) Scope

This document establishes NRCS standards for preparing Computer Aided Design (CAD) and integrally related design products within the USDA NRCS.

#### (b) Purpose

The purpose of this document is to set a CAD standard to ensure consistent electronic deliverables (products) within NRCS. It provides guidance for implementing the policy found in the National Engineering Manual Part 541, Drafting and Drawings. CAD standardization allows anyone in the organization to access, interpret, and disseminate information rapidly and in a uniform manner.

#### (c) Target systems

This document is not targeted toward any specific CAD system or software. Within the various commercially available CAD systems, many identical or related concepts are given different names. To aid users of this document, some instances of software specific examples are listed in appendix A. Any reference to software packages in this document is not an endorsement of those products.

#### 641.0101 Graphic concepts

#### (a) Presentation graphics

Presentation graphics typically consist of drawing elements such as lines, arcs, shapes, text and their attributes (line color, line width, and line style). It is recommended that the drawing elements have their properties set to ByLayer/ByLevel so they utilize the line width, line type/style, and color of the layer/level they are on.

#### (b) Line styles

Contrasting line widths and types are used within a drawing to delineate types of information.

#### (1) Width

The five line widths defined below, along with options 1 through 3, are considered sufficient and should not be expanded unless an appreciable improvement in drawing clarity or contrast can be realized. Line width specification, comparison, details, and examples are shown in appendix B.

- Fine—Fine lines should be used sparingly, mostly
  for material indications, surface marks, hatching/
  patterning, fine gridlines, and minor contours.
   This line width typically does not reproduce well
  in blue-line format and/or in photocopies.
- Thin—Thin lines should be used for depicting dimension lines, dimension leader/witness lines, leader lines, line terminators, phantom lines, hidden lines, centerlines, break lines, schedule gridlines, major contours, and object lines seen at a distance.
- Medium—Medium lines should be used for depicting minor object lines, dimension text, text for notes/callouts, and schedule text.
- Wide—Wide lines should be used for major object lines, section cutting plane lines, and minor titles.

- Extra wide—Extra wide lines should be used for schedule outlines, major titles, and object lines requiring special emphasis. For large-scale details drawn at 3 inches = 1 foot or larger, the extra wide lines should be used for the object lines. Extra wide lines are also appropriate for use as an elevation grade line, building footprint, or top of grade lines on section/foundation details.
- Option 1—This line width should be used for asbuilt features, and separating portions of drawings.
- Option 2 and Option 3—These line widths should be used for border sheet outlines, cover sheet line work, and as an option for the designer as required.

#### (2) Type

Some common line types have been provided for features such as:

- · existing ground surface
- bank lines in profile
- baseline
- centerline
- stations
- excavation
- fill
- · existing banks
- contour lines
- work limits
- fences
- water lines
- streams

See appendix C for NRCS standard line types. Additional line types may be used if needed.

#### (c) Grayscaling

To achieve greater contrast between features, grayscaling may be utilized. When using grayscaling, it is recommended that line widths be increased to the next larger width.

#### (d) Color

Colors should be utilized to define specific features. They are a personal preference option and are not associated with any particular drawing property.

#### (e) Text style

Contrasting text styles are used within a drawing to delineate types of information. Text style encompasses fonts, size, and other properties. The text type will determine the text style that is used. Text fonts and sizes shall adhere to the figures shown in appendix D. These text styles apply to the contents of the drawing and are not intended for cover sheets.

#### (1) Type

The following types of text shall be used:

- Notations—Notes, dimensions, and annotations shall be sentence case. An oblique font may be used for notation text; however, the font used should be consistent throughout the entire drawing set.
- Subtitles—Denotes secondary drawing elements and shall be uppercase.
- Titles—Denotes primary drawing elements and shall be uppercase.

#### (2) **Font**

In most drawings, the four fonts listed below should be sufficient.

- Proportional font—This font creates text where the characters are proportionally spaced. It is appropriate for general notes, labels, or title blocks.
- Oblique font—A slanted font is used where text needs to be easily distinguished from other text.
   This font can be created by using a proportional font with an oblique angle set to 22 degrees.
- Monotext font—This font creates text characters that are evenly spaced. Monotext font should be used where text fields need to be monospaced (vertically aligned), such as in schedules, tables, or similar instances.
- Filled font—Filled fonts are used primarily for cover sheets.

#### (3) Size

Chapter 1

Drawing text size for each type of text should be consistent throughout the drawing set.

#### (f) Border sheets

Custom NRCS border sheets have been created to ensure consistency within the agency's drawing sets. These sheets are available through the National Design, Construction, and Soil Mechanics Center (NDCSMC) Web site.

#### (1) Sheet size

All drawings in a set shall be prepared on the same size sheets. Sheet sizes used within NRCS are identified in NEM Part 541, Drafting and Drawing Policy.

#### (2) Title block

Title block sheets used with NRCS drawings are identified in NEM Part 541, Drafting and Drawing Policy. The text font used in the project identification information shall be consistent with the drawing text. Title block fonts should be consistent throughout the drawing set.

#### (g) Drawing scales

All drawing objects should be drawn at full scale (1=1) and plotted at the selected scale. Standard bar and graphic scales will be included in the standard block/cell libraries provided.

#### (h) Dimension styles

Dimensions must be accurate and adequate. Care must be taken to show a single dimension only once in its proper location. Avoid the tendency to over dimension. Dimensioning examples and dimension style settings are shown on appendix E, figure 1. Dimension style naming convention is shown on appendix E, figure 2.

#### (1) Placement

Generally, dimensions should be located outside of the object being dimensioned. This minimizes clutter and overlap with other graphics. Dimensions outside the object should be located at the top and/or the right side of the object whenever possible. When dimensions must be shown on the interior of the object, they should be arranged for clarity and consistency.

#### (2) Terminators

Terminators define the junction between a dimension line and the extension lines leading to the start and finish of the dimension. These terminators are in the form of a leader arrow or a short slanted line (slash). Consistency in terminator form should be achieved throughout the drawing set.

#### (3) Text style and location

Dimension text style shall match the text style in the drawing. Where possible, the text should be centered and above the dimension line, as well as aligned with the dimension line. The text shall be readable from the bottom of the sheet or right hand side of the sheet.

#### (4) Leader lines

Leader line terminators should be consistent with dimensioning settings. Either straight or spline leader lines may be used; however, they shall be consistent throughout the drawing.

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# 641.0102 Drawing file organization

#### (a) Directory structure

Organizing drawing files within project directories should provide a convenient and clear structure for file management. A typical directory structure may include the following:

(Drive):\Projects\State\County\Project Identifier\User Definable Filename

#### (b) Electronic drawing file naming

Naming electronic drawing files allows CAD users to determine the contents of a drawing without actually displaying the file. Following is a suggested file naming example:

 $\{Two\-letter\ state\ abbreviation\}\{Fiscal\ Year\}\{project\ identifier\}$ 

#### (c) Standard drawing identification

#### (1) National drawings

Digitized/Scanned National Standard Drawings are identified by filenames based on the existing engineering standard (ES) drawing numbers, as outlined in Design Note 18, Group A – Schedules of National Standard Detail Drawings.

#### (2) State drawings

As developed, these drawings should be identified by the following:

Two letter state abbreviation-user definable (practice code and drawing description)

#### (d) File transfer

When transferring project files to another office, it is suggested that the project name and/or file names be renamed to reflect that it is no longer the official copy of the project. Special attention should be given to ensure that all associated referenced and support files are transferred with the project files or are available to the recipient.

#### (e) File archiving and storage

The General Manual Title 120, Part 408, Subpart B gives the policy for file maintenance of electronic drawings. Files should be stored in a location where they will be backed up and archived according to State practices. Electronic records must be easily retrievable until their authorized disposition date. When automated systems are upgraded or replaced, action must be taken to ensure that records continue to be usable until their authorized disposition date. Disposition schedules are provided in General Manual Title 120, Part 408, Subpart D, NRCS Records Guide.

# 641.0103 Layer/level assignments

#### (a) Layer/levels

CAD layers or levels are analogous to overlays in manual drafting systems and serve to separate graphic elements (lines, shapes, and text) according to the design discipline they represent. They are used to optimize efficiency and organization of the drawing. Appendix F gives a detailed explanation of abbreviations for layer/level naming.

#### (1) Naming convention

A naming convention needs to allow for easy filtering and should be descriptive of the objects on that layer/level. The layer/level naming system defined below is based on conventions presented by the American Institute of Architects (AIA) and the CADD/GIS Technology Center, Vicksburg, Mississippi. This method allows similar items to be grouped together. It allows for filtering of layer/level names in the layer manager to display customized lists of layers/levels.

This method consists of:

- a single character *discipline code* (C for civil site, W for civil works, S for structural)
- a four-character *major group* (Plan for plans, Prof for profiles)
- ullet an additional four-characters for a  $minor\ group$
- an additional four character additional descriptor to further differentiate items within the minor group

A period is used as a delimiter between the group descriptors.

Example of layer/level naming convention: C.Topo.Ognd.Indx

This example has:

C = civil site (discipline code)

Topo = topography ( $major\ group$ )

Ognd = original ground surface (minor group)

Indx = index contours (additional descriptor)

#### 641.0104 **Symbology**

#### (a) Symbology library

CAD software packages include common industry standard symbology, as well as allowing the user to define custom symbology. An NRCS standard symbology library will be provided to enhance productivity and ensure uniform drawing standards within the agency. This library will contain custom block/cell, hatching/patterning, and line types/styles. Links to the library can be found on the NDCSMC Web site.

#### (1) Block/cell

A block/cell is a group of graphical elements that can be manipulated as a single entity. Blocks/cells are saved for efficient repetitive use in more than one drawing, and therefore, enhance productivity and provide an excellent opportunity for CAD standardization. Blocks/Cells are saved in a separate file as part of a symbol library. They should be created at a 1:1 scale with a base point of 0,0,0 and inserted into the drawing at a scale that corresponds to the drawing plotting scale.

#### (2) Hatching/patterning

Hatching/patterning is defined as repeated drawing elements (lines, dot, circles) within a defined area.

#### (3) Line types/styles

Line types/styles are a graphical representation of linear drawing features.

# 641.0105 Implementation tools

National tools will be available to implement these standards. These tools may include:

- drawing templates
- prototypes
- title blocks
- symbology files (custom line types/styles, block/ cell libraries, and custom hatching/patterning files)
- charts and tables that include calculated settings for text and dimension styles
- expanded layer/level naming conventions
- example field code format and symbology
- documentation explaining how to use the above mentioned tools

Links to these tools are available on the NDCSMC Web site.

#### 641.0106 References

- American Concrete Institute. 1994. Publication SP-66 (94), ACI Detailing Manual. Includes Details and Detailing of Concrete Reinforcement (ACI 315-92) and Manual of Engineering and Placing Drawings for Reinforced Concrete (ACI 315R-94).
- American National Standards Institute. 1994. ANSI/ ASME Y14.3M Multiview and Sectional View Drawings.
- American National Standards Institute. 1992. ANSI/ ASME Y14.1M Metric Drawing Sheet Size and Format.
- American National Standards Institute. 1992. ANSI/ ASME Y14.2 Line Conventions and Lettering.
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- United States Department of Agriculture, Natural Resources Conservation Service. Standards and Guidelines for Computer Aided Drafting. West Region.
- United States National CAD Standard. 2001. Version 2.0, vol. 1 and 2.

# **Appendix A**

# **Interchangeable Terminology**

	Interchange	eable Terminology
AutoCAD	MicroStation	Definition
64-bit floating point d/b	Integer d/b	The method for storing drawing attribute data.
Memory-based	Disk-based	Where drawing data are stored until the active file is closed.
User Coordinate System (UCS)	Auxiliary Coordinate System (ACS)	An XYZ coordinate system where the origin is selected by the user.
Current	Active	File or object in use.
Block	Cell	Single or multiple entities grouped together to create a single element.
Dimensions styles	Dimension attributes	Controls the appearance of dimension elements.
.dwg	.dgn	A DOS-based extension for drawing files.
Explode	Drop	Converts an element into multiple entities.
Dragmode/rubberbanding	Dynamic update	Display of elements(s) being drawn or modified as pointer/cursor moves on the screen.
Entity	Element	A single object contained in a drawing.
Zoom all	Fit	Displays all graphics currently in the drawing file.
World Coordinate System/Origin	Global origin/ design cube	Defines the location(s) of all entities in a design/drawing using the Cartesian coordinate system.
Select/pick	Identify/accept	Entity or entities chosen for manipulation or modification.
Slide	Image	A screen capture of graphics in raster format.
Command prompt	Key entry field	Allows for keyboard input from users.
Object snap (Osnap)	Key point snap	Controls the selection location for entities.
Layers	Levels	Used as transparent overlays for display graphics.
Linetype	Line style	Defines the appearance of lines.
Polyline	Linestring	Connected line segments.
Pickbox	Locate tolerance	Identification/selection limits for the drawing cursor.
ARX/AutoLISP	MDL/Visual BASIC	System-specific command language.
Status line	Message field	Displays current drawing status and/or text output from the application.
Insertion point	Monument point	Benchmark point used to place objects in a drawing.
Move	Move element	Relocation of entities.
Hatching	Patterning	To fill an area within a drawing with a symbolic texture.
Coordinate entry	Precision key in	User-defined XYZ values.
External reference	Reference file	A design/drawing file attached to an active drawing.
Prototype drawing	Seed file	A drawing design template file.
Pointing/pick point	Tentative/Data point	A point within the drawing selected using a pointing device.
Redraw/Regenerate	Update	Refereshes screen display.

# **Appendix B**

# **Line Width/Weight**

Figure B-1 Comparison of line widths/weights

	Comparison of Line Widths				
Line Thickness	Leroy Pen Designation	(mm)	(in.)	Microstation Line Weight	Line Weight Example
Fine	0000	0.18	0.007	wt = 0	
Thin	000	0.25	0.010	wt = 1	
Medium	0	0.35	0.014	wt = 2	
Wide	1	0.50	0.020	wt = 3	
Extra Wide	2.5	0.70	0.028	wt = 5	
Option 1	3.5	1.00	0.040	wt = 7	
Option 2	n/a	1.40	0.055	wt = 10	
Option 3	n/a	2.00	0.079	wt = 15	

Figure B-2 Line width/weight examples

		Line Width/Weight Examples	
Line Thickness	Examples of Typical Useage	Line Width/Weight for 8.5" x 11" (Size A) 11" x 17" Sheets (Size B)	Line Width/Weight for 22" x 34" Sheets (Size D)
Fine	Fine Grid Lines Hatching/Patterning Minor Contours Material Indications Surface Marks	0.004 (in.) 0.09 (mm)	0.007 (in.) 0.18 (mm)
Thin	Dimension Lines Leader Lines Line Terminators Schedule Grid Lines Major Contours Phantom Lines Hidden Lines Centerlines Break Lines	0.005 (in.) 0.13 (mm)	0.010 (in.) 0.25 (mm)
Medium	Minor Object Lines Notations	0.007 (in.) 0.18 (mm)	0.014 (in.) 0.35 (mm)
Wide	Section Cutting Plane Lines Subtitles Major Object Lines	0.010 (in.) 0.25 (mm)	0.020 (in.) 0.50 (mm)
Extra Wide	Titles Schedule Outlines Special Emphasis Object Lines Large Scale Details	0.014 (in.) 0.35 (mm)	0.028 (in.) 0.70 (mm)
Option 1	Partitioning Lines Asbuilt Features	0.020 (in.) 0.50 (mm)	0.040 (in.) 1.00 (mm)
Option 2	Border Sheet Outlines	0.028 (in.) 0.70 (mm)	0.055 (in.) 1.40 (mm)
Option 3 Cover Sheet Linework		0.040 (in.) 1.00 (mm)	0.079 (in.) 2.00 (mm)

# **Appendix C**

# **NRCS Standard Line Types**

Sample Line	Line Style Name	Line Use
	Continuous	A solid line for most drawing purposes.
	Bank_Profile	Bank line in a profile view.
	BK	Bank line in a plan view.
	BORDER	Border of unknown type.
	BU	Buried utility line (label type of utility).
	CL	Centerline of structure in a plan view, or alignment.
	CLXS	Centerline in a section or profile sheet.
	County_Line	County boundaries.
	Diversion	Diversion in a plan view.
xx	FC	Existing fence in a plan view.
II	Fence_New	Indicates fence to be constructed.
⊗	Fence_Remove	Indicates existing fence to be removed
	FL	Stream flow line.
	FL1	One dot flow line.
	FL2	Two dot flow line.
	FLProfile	Flowline profile.
	Ground	Ground line in a section view.
	Ground_Profile_Minor	Ground line in a profile view.
	Culvert_Existing	Existing culvert.
	Culvert_New	New Culvert
	GRID1	Large Gridline.
	GRID2	Small Gridline.
	HIDDEN	Hidden line in all views.
	PHANTOM	Phantom line in all views.
<del></del>	Terrace	Terrace in a plan view.
<del></del>	Tile_Existing	Existing tile line in a plan view.
<del></del>	Tile_Proposed	Proposed tile line in a plan view.
	Township_Line	Township boundary.
+++++++++++++++++++++++++++++++++++++++	RR_Tracks	Railroad tracks.
<del></del>	RR_Tracks_Abandoned	Abandoned railroad tracks.
	Water_Line	Underground water line.
	Work_Limits	Work limits on a plan view.
	STANDARD	Multi-line style, default.
	DIRTROAD	Multi-line style, dirt road on location map.
	RoadImproved	Multi-line style, improved road on location map.
	RoadPaved	Multi-line style, paved road on location map.
	Open_Ditch	Multi-line style, open ditch on plan view.
	Open_DitchC	Multi-line style, open ditch to be cleaned on plan view.

## Appendix D

### **Text Sizes and Styles**

Figure D-1 Text style types and sizes

Type of Text	22" x 34" Drawing (ANSI Size D)		8.5" x 11" Drawing (ANSI Size A) 11" x 17" Drawing (ANSI Size B)	
	Plotting Text Height	Plotting Text Weight	Plotting Text Height	Plotting Text Weight
Notation (Option A)	0.125" (1/8")	0.35 (mm) 0.014 (in.)	0.063" (1/16")	0.18 (mm) 0.007 (in.)
Notation (Option B)	0.156" (5/32")	0.35 (mm) 0.014 (in.)	0.078" (5/64")	0.18 (mm) 0.007 (in.)
SUBTITLE	0.188" (3/16")	0.50 (mm) 0.020 (in.)	0.094" (3/32")	0.25 (mm) 0.010 (in.)
TITLE	0.219" (7/32")	0.70 (mm) 0.028 (in.)	0.109" (7/64")	0.35 (mm) 0.014 (in.)

Figure D-2 Text style naming

AutoCAD Template drawings contain preset text styles for varying scales. The text style name reflects the intended scale and sheet size as well as the type of text that is used.

Drawing Scale
Sheet Size
Type of Text
010xB Notation(A)

Text that is placed in modelspace needs to be inserted based on the plot scale of the view. Example: Use the 010xB\_Notation(A) text style for text that is placed in modelspace which is intended to appear in a viewport plotted at a 1"=10' scale on an (ANSI Size B) 11" X 17" size drawing. Use the 001x version of a text style for paper space dimensioning.

Figure D-3 Text style fonts

Proportional Font: A,B,C,D,E,F,G,H,I,J,K,L,M,N,O,P,Q,R,S,T,U,V,W,X,Y,Z

In AutoCAD, use the RomanS (Roman Simplex) font with a width of 1.0.

In Microstation, use Font #1.

Oblique Font: A,B,C,D,E,F,G,H,I,J,K,L,M,N,O,P,Q,R,S,T,U,V,W,X,Y,Z

In AutoCAD, use the RomanS font with the Obliquing Angle set to 22 degrees.

In Microstation, use Font #23.

Monotext Font: A, B, C, D, E, F, G, H, I, J, K, L, M, N,  $\square$ , P, Q, R

S, T, U, V, W, X, Y, Z

In AutoCAD, use the Monotxt font.

In Microstation, use Font #3.

#### Filled Font: A,B,C,D,E,F,G,H,I,J,K,L,M,N,O,P,Q,R,S,T,U,V,W,X,Y,Z

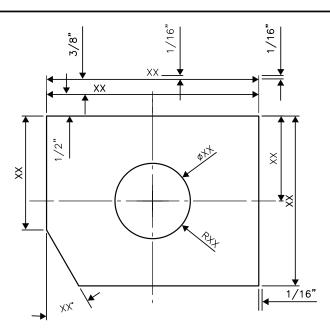
In AutoCAD, use the Swis721 BlkBT.

In Microstation, use Font #43.

### **Appendix E**

### **Dimensioning**

Figure E-1 Dimensioning examples and style settings

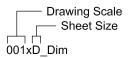


For full size drawings, dimension text shall be shown at top and/or right side of the dimension line and located 1/2" from the object. All subsequent dimensions shall be spaced 3/8" apart. All dimensions shall have a gap (offset) of 1/16" from the object and shall have a 1/16" extension past the arrowhead.

Dimension style settings are based on the text height and drawing scale used. The dimension text height is determined by multiplying the text height by the scale factor. The text offset from dimension line, extension line beyond and offset from origin should be set at 1/2 of the dimension text scale. The arrowhead and centermark for a circle should be set at 1.5 times the dimension text scale.

Figure E-2 Dimensioning style naming

NRCS AutoCAD template drawings contain preset dimension styles for varying scales. The dimension style name reflects the intended scale and sheet size. Example as follows:



Dimensioning that is placed in modelspace, needs to be inserted based on the plot scale of the view.

Example: Use the 048xB\_Dim text style for dimensioning that is placed in model space which is intended to appear in a viewport plotted at 1/4"=1" scale on an (ANSI Size B) 11"X17" size drawing.

Use the 001x version of a dimension style for paper space dimensioning.

# **Appendix F**

# **Layer/Level Naming (Explanation of Abbreviations)**

Level Name Position Separate O O AutoCAD's default layer Separate O O O O O O O O O O O O O O O O O O O					
Name   Position   Separate   O					
Position   Separate   Operations   AutoCAD's default layer   Separate   Operations   AutoCAD's default non-plotting layer		Abbreviation	Explanation		
Separate   O					
Separate   Defpoints   AutoCAD's default non-plotting layer		0	AutoCAD's default laver		
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Covr Cover					
		Ctrl	Horizontal or vertical control		
Cut_ Cut portions of surface model comparisons					

Layer/		
Level	Abbreviation	Explanation
Name	Abbieviation	Explanation
Position	Davis	Divided also affect and also
3rd	Dem_ Demo	Digital elevation models  Items to be demolished
	Denio	Depressions in a surface model
	Digi	Digitized surface model objects
	Ditc	Ditch
	Drai	Drains
	Edge	Edge of
	Embk	Embankment
	Exca	Excavation Fence
	Fenc Fill	Fill portions of surface models
	Fine	Fine grid lines
	Fini	Finished surface models
	Flor	Floor
	Flow	Flowlines
	Fndn	Foundation
	Foot Genl	Footing General
	Gent	Geotextile
	Grid	Grid of a topographic surface
	Grub	Grubbing area
	Hevy	Heavy grid lines
	Htch	Hatch patterns and boundaries
	Hwall	Head wall
	Impt	Importing points
	Join Land	Joining contours Land use objects
	Land	Line type objects
	Logo	NRCS logo
	Lots	Lots
	Lwall	Left wall
	Merg	Merged surface models
Minor Group	Misc	Miscellenous objects
Gro	Note Objc	Notes and dimension style text Object
Jor	Oguu	Original ground surface model at a user defined scale (user should replace U's
Ξ	Ogua	with scale of surface model)
	Ognd	Original ground survey & surface model
	Outc	Outlet channel surface model
	Ovlp	Overlap markers
	Pipe	Pipe Points
	Poin Pool	Pool area delineation
	Prop	Property line
	Rblk	Revision block objects
	Rlrd	Railroad
	Road	Roads
	Rwall	Right wall
	Sblk	Standard drawing block
	Scco Scpt	Stream channel clean out surface model Survey control points
	Seed	Seeding area delineation
	Slab	Slab
	Slop	Slopes of surface models
	Smdl	Surface model
	Soil	Soil boring & geotechnical
	Stex	Structure excavation surface model Stripping surface model
	Strp Stru	Structure
	Subb	Sub-basin delineation
	Subt	Subtitle style text
ļ	Tang	Tangents & vertical curves
	Terr	Terrace
	Text	Title block text
	Tick	Tick marks (tick marks indicate where to cut sheets from roll paper) Tile
	Tile Tird	Tie rod
	Titl	Title style text

Layer/							
Level	Abbreviation	Explanation					
Name		·					
Position	-	Field and attribute at the often amounts.					
3rd	Topo	Field code attribute style of topography					
	Trav	Traverse survey Tree					
	Tree	Trash rack					
으	Trsh	Toe wall					
<u> </u>	Twall						
ပို့	Util	Field code attribute style or Utility objects (i.e. gas, electric, water, etc.)					
Minor Group	Vege	Vegetation Water line delineation					
Ξ	Wlin Work	Work limit delineation					
	Wwall	Wing wall					
		Waterway					
4th	Wway						
4th	Anot	Annotation (labelling of contours, etc.) Arrows					
	Arro Asbl	Asbuilt					
		Border on title block sheet					
	Brdr	Concrete					
	Conc Cord	Coordinates (northing, easting)					
	Ctch	Catch lines					
	Demo	Demolition					
	Deno	Description of survey shot					
	Desc	Depth					
	Drai	Drains					
	Edge	Edges (of waterways, road, etc.)					
	Elev						
	Exst	Elevation					
	Feat	existing Feature lines					
	Flod	looded pool delineation					
	Flow	Flowlines					
	Grid	Grid of a topographic surface					
	Hach	Slope hachures					
	Htch	Hatch patterns					
	Ifac	Inside face					
Additional Descriptor	Indx	Index contours					
j	Intr	Intermediate contours					
esc	Line	Lines					
	Long	Logitudinal steel					
na	Mark	Tick marks					
≝	Mfac	Mid face					
ᄝ	Mod	Modification					
^	Muuu	User defined mark layers					
	Mud_	Mud					
	New_	Planned or new objects					
	Nmbr	Point number					
	Norm	Normal pool delineation					
	Ofac	Outside face					
	Part	Border sheet partition line					
	Pipe	Pipe					
	Rack	Trash rack					
	Ridg	Ridge					
	Slop	Slope lines projected to					
	Strp	Stirrup					
	Ston	Stone hatch patterns (riprap)					
	Text	Text					
	Ties	Ties					
	Tin	Triangulated irregular network					
	Toe_	Structure/terrace toe lines					
	Trks	Railroad tracks					
	Uuuu	User defined contours (the user should replace the U's with numbers to indicate					
		the elevation)					